Christopher A. Hart
Vice Chairman

Some Future Concerns

– Pilot professionalism

  • Loss of military pipeline

  • Civilian filters inadequate

  • Recent troubling events

– Overzealous criminalization of accidents

  • Undercuts proactive information programs

  • Hinders investigations

  • Reduces likelihood of addressing system issues

– Increasing automation

Increasing Automation: Good News, Bad News

– More complexity increases likelihood that operators will not completely understand the system

– More reliability increases likelihood that operators have never seen a given malfunction before, even in training

– Automation often masks the problem of less proficient pilots – until something goes wrong

Examples

– Strasbourg, France (1992)

– Cali, Colombia (1995)

– Amsterdam, Holland (2009)

– Rio to Paris (2009)

– San Francisco (2013)?

Strasbourg, France

– Risk Factors

  • Night, mountainous terrain

  • No ground radar

  • No ground-based glideslope guidance

  • No airborne terrain alerting equipment

– Very Sophisticated Autopilot

– Autopilot Mode Ambiguity

Human Factors Challenge

– "3.2" in the window, *with a decimal,* means:

  • Descend at a *3.2 degree angle (about 700 fpm at 140 knots)*

– "32" in the window, *without a decimal,* means:

  • Descend at *3200 fpm*

Clue: Quick Changes in Autopilot Mode
Frequently Signal a Problem

Flight data recorder readout program could have helped safety experts identify this problem

Cali, Colombia

– Risk Factors

- Night

- Airport in deep valley

- No ground radar

- Airborne terrain alerting
  limited to "look-down"

- Last minute change in approach

  ➤ More rapid descent (throttles idle, spoilers)

  ➤ Hurried reprogramming

– Navigation Radio Ambiguity

– Spoilers Do Not Retract With Power

Recommended Remedies:

- Operational

    - *Caution re last minute changes during the approach!!*

- Aircraft/Avionics
    - Enhanced ground proximity warning system
    - Spoilers that retract with max power
    - Require confirmation of non-obvious changes
    - Unused or passed waypoints remain in view

- Infrastructure
    - Eliminate single-letter navigational radio identifiers
    - Ground-based radar
    - Improved reporting of, and acting upon, safety issues

Amsterdam, Holland

– The Conditions

- Malfunctioning left radar altimeter
- Pilots selected right side autopilot
- Aircraft vectored above glideslope
- Autothrust commanded throttles to idle

- Unknown to pilots, right autopilot used left radar altimeter
- Pilot unsuccessfully attempted go-around

– Queries:

- Should autopilot default to same side altimeter?
- More clarity re source of information? Ability to select?

Rio to Paris

- The Conditions
  - Cruise, autopilot engaged
  - Night, in clouds, turbulence, coffin corner
  - Ice blocked pitot tubes
  - Autopilot and autothrust inoperative without airspeed
  - Alpha protections disabled
  - Pilots' responses inappropriate

- Queries:
  - Pilot training re loss of airspeed information in cruise?
  - Importance of CRM – pilot knowing other pilot's actions?
  - Pilot training re manual flight at cruise altitude?

Conclusion

– Automation has significantly improved safety, reliability, and productivity

– We can and must address more effectively the human/machine interface challenges of increasingly complex and increasingly reliable automation

Thank You

Questions?